

1 Introduction

Although French is quite generally described in the literature as a ‘negative concord language’ as it readily allows for a single negation or concord reading of sentences that feature multiple potentially negative terms like (1) Haegeman (2006), Zeijlstra 2004,2010, De Swart 2010 among many others), it is nonetheless well known that the same sequences of negative concord items (NCI) (Wantanabe 2004) also quite readily allow for a double negation reading in which the negative meanings of the NCIs cancel out to a positive statement, here describing a world where everyone loves at least someone. (Corblin (1996) Déprez (1997, 2000) Corblin & Tovenà (2003),

- (1) *Personne n’aime personne*
 NCI.person likes NCI.person

Concord: Nobody loves anybody
 Double negative: Nobody loves nobody
 \therefore Everybody loves someone

As De Swart & Sag note: “French speakers agree that sentences like (1) have a double negation reading as well as a concord reading” (De Swart & Sag 2002:376)¹. In the same vein, Zeijlstra (2010:fn. 1) acknowledges that “under special intonation multiple negative constructions also allow Double Negation (DN) readings’ although these are not the focus of his work. Experimental evidence in support of these possibilities are reported in Deprez... , forthcoming(), Déprez and Yeaton ()).

As the quote from Zeijlstra (2010) points out, it is also quite generally agreed that intonation plays an important role in favoring or perhaps licensing each of these different interpretations. Various suggestions as to how the intonation may affect the interpretation of sentences like (1) have been offered in the literature. Corblin (1996:15) for instance suggests that “If one of the negative quantifiers is stressed, the bi-negative reading is highly favoured”, while Corblin and Tovenà (2003:24) consider, more specifically, that the double negation reading is fostered if the first *personne* in the negative sequence is emphasized. A similar intuition is also reported in an early Linguistics List post (1999) (Query Linguist list 10.1587 Negation in French) that informally surveyed French speakers on the interpretation of sentences like (1) and the relationship between their prosody and their interpretations. Some speakers felt that emphasis on the second syllable of *personne* was what governed their access to the double negation interpretation in (1). Yet in the same post, other speakers reported quite distinct intuitions. For one speaker, the meaning associated with an emphasis on the first *personne* although still a double negation was distinct from (1) and purely existential (someone loves someone). For others, it was the NC interpretation that was prosodically characterized: it required a ‘symmetrical emphasis’ on both *personne*. Yet others found that a DN reading required emphasis on the second *personne* rather than on the first. In sum, and perhaps unsurprisingly, the post revealed quite a lot of variability among French speakers intuitions with respect to either the interpretation of these sentences or the possible relationship that these interpretations entertains with their prosody.

These variable judgments highlight a number of central issues of great current interest that these French multiple negative sentences forcibly raise. On the one hand, the question of when and how speakers can access double negation readings in multiple negative sequences in NC languages is of critical relevance to much debated issues in the theoretical approaches to negative concord and negative dependencies. On the other hand, these constructions dramatically emphasize the intricacies of the interaction between prosody, syntax and interpretation in allowing speakers to reverse the meaning that seemingly identical strings can convey. The flip between NC and DN readings of such sentences recalls the visual ambiguities of a Necker cube where the same construct in producing the perception of two opposite geometric objects reveals the computational complexity of our visual system. DN readings are quite universally considered as marked readings surely in languages of the NC type, but also more generally even in languages that have been

¹Their example (3b) equivalent to our (1).

described as double negation languages. Challenging questions arise concerning the status that these double negative readings should have in the grammar of the languages that allows them. Should the grammar of NC languages allow for this possibility just as the grammar of double negative languages is assumed to do and if so could the distinction between NC and DN languages still be modeled in terms of parametric choices? Or, on the contrary, should these readings be considered irrelevant to the grammar of NC languages, if as proposed by Espinal & als, they are pragmatically-oriented (Horn 1985) non-compositionally inferable outputs of denial mechanisms? Most studies concerned with multiple negative sentences have so far largely focused on proposing either syntactic or semantic solutions to the compositional challenge that the concord readings raise for multiple negative sentences. But double negative readings, which raise no particular compositional problem and are rarely perceived as natural, have generally received far less attention, being sometimes dismissed as a phenomenon largely orthogonal to the study of negative concord (Zeijlstra 2004). As is known, however, their possibility is one of the most solid empirical facts that distinguishes negative concord from other negative dependencies such as negative polarity construction and in this respect, a better understanding of their availability for speakers could well turn out to be central to building empirically sharper theoretical accounts of negative concord.

Multiple negative constructions also acutely challenge our understanding of the interactions that prosody entertains with the syntax on which these interpretations are built. Given that the NC and DN readings are clearly distinct, do speakers produce robust phonetic cues that reliably distinguish these two readings and map to a distinct prosodic profiles? If so what are the phonetic ingredient of these distinct prosodic profiles? Are listener able to perceive and recruit these cues to retrieve a particular interpretation?

It is rather remarkable that, in spite of the numerous theoretical discussions that have surrounded French multiple negative constructions in the literature, there are as of yet no systematic study of their prosody and of the role that prosody can play in disambiguating or influencing their interpretation. This stands in notable contrast to studies on the intonation of multiple negative sentences that have been conducted in other languages like English (Blanchette et als) Dutch (Fontville et als), Afrikaans (Huddleston), Catalan or Spanish (Prieto et als, Espinal et als). Seeking to fill in this gap, in this paper we report the results of two experiments, one production experiment and one perception experiment that have specially targeted French double negative sentences and focused on how prosody affects their interpretation. Previewing our conclusions, we show that although there is some amount of variability, French speakers reliably produce characteristically different phonetic cues and different prosody for the two interpretations of negative concord or double negation of simple transitive sentences with NCI arguments like (1) and that the differences can be perceived and recruited to a certain extent by hearers to retrieve the intended meaning of these sentences.

This paper confirms the ambiguity of sentences like (1) for native speakers of French as well as the important role that prosody plays in disambiguating them and provides a characterisation of the phonetic cue recruited for this task. We show that despite variability in speaker production, there are some definable phonetic and prosodic correlates to sentence interpretation. On the basis of our results, the paper also discusses the possible consequences that this confirmation unfolds for various possible models of negative concord. We also address the issue of the relative markedness of these double NCI sequences under either of their interpretations and challenge in part the general assumption that the realisation of contradictory contour is always required to license double negative readings. The paper is organized as follows. In the first section, we critically review a number of studies on the prosody of double negative sentences in other languages that have inspired our own design. Our goals have been to emulate the lessons taken from these previous works as well as to labor to avoid various pitfalls in our design. The next section details the methodology of our production study. We then report our results and discuss their significance. Our next section turns to our perception study. Likewise here we begin by outlining our experimental protocol before considering our results and discussing their import and consequences. The last section offers a discussion of our results outline their consequences for the broader issues of theoretical accounts of negative concord and of the relations between interpretation and prosody.

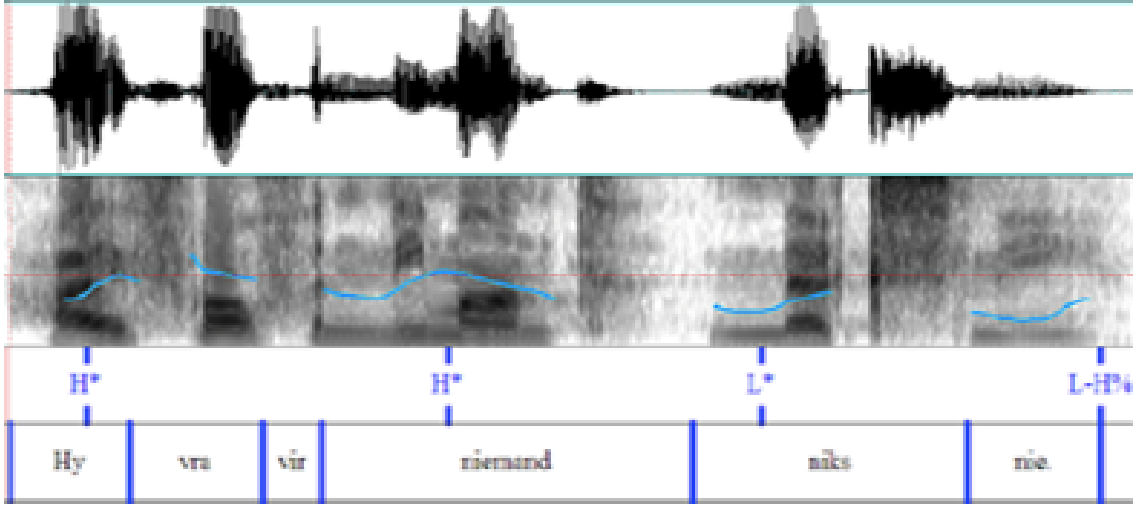


Figure 1: Huddleston’s DN contour

”Prosodic contour for DN interpretation of multiple NI combination (H*L*L-H%)

1.1 Previous studies on the intonation of double negative sentences

In this section we critically review the previous experimental study of the prosodic of multiple negative sentences that are the antecedent of our work although they each concern languages other than French. For each of these studies we describe their methods and results. We conclude with a brief summary of the various problem encountered in these studies which served to motivate the methodology adopted in our own.

1.1.1 Huddleston (2010) and Huddleston and De Swart (2014)

The effect of prosody on the interpretation of double negative sequences was to our knowledge first experimentally examined in Afrikaans with a perception study by Huddleston in her (2010) dissertation and in Huddleston & De Swart (2014). In the two experiments they ran (two versions of the same experiment with different readers of the stimuli) participants were asked first to assess the grammaticality of a list of recorded sentences that features two negatives quantifiers produced either with a ‘contradictory contour’ or with ‘a declarative contour’ and second to evaluate the meaning of these recorded sentences. What is called the ‘contradictory contour’ in this experiment is described as featuring a prenuclear H* pitch accent (generally on the first negative indefinite), followed by a nuclear accent L* (on the second negative indefinite), and finished off with an L-phrase accent and an H% boundary tone. A sample of this contour is provided in figure 1.

In contrast, the contour assumed to be neutral and characterize the NC reading termed ‘the declarative contour’ is described as featuring an intonation phrase containing one or more H* pitch accents and ending in a sequence of L- phrase accent and L% boundary tone. It is illustrated in figure 2.

The stimuli used in this perception test were recorded by 2 students at Stellenbosch University asked to produce sentences, to our knowledge without context, with an intonation that would convey a DN or an NC reading. Only sample contours such as the ones provided above were inspected, but the prosody of the actual recordings used in the test were not all inspected or controlled for. For the acceptability judgment test, participants were found to rate sentences with two negative quantifiers at about the same acceptability rate with either of the contours presented (72% for the NC contour, 75% for the DN contour)². This showed that participants accepted

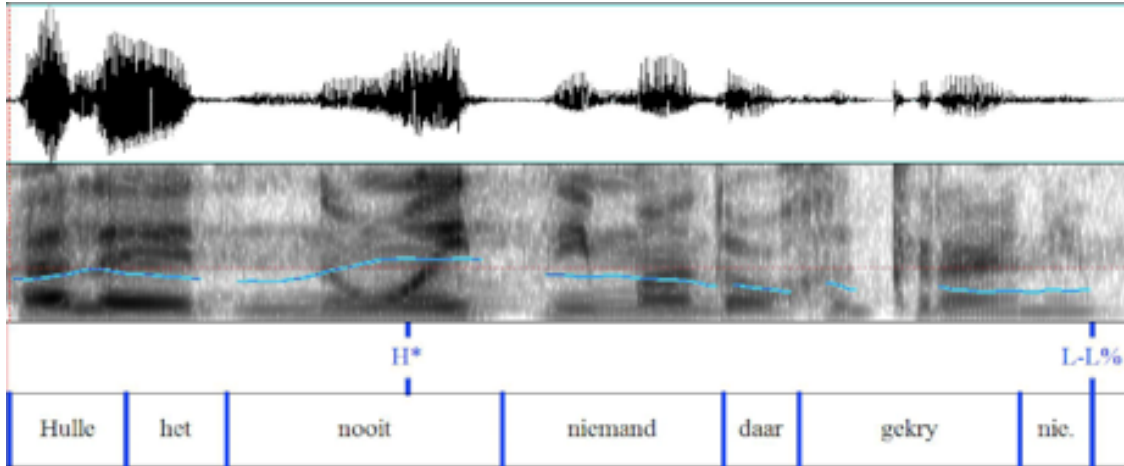


Figure 2: Huddleston’s NC or declarative contour

these sentences quite readily independently of the prosody they were presented with, a conclusion that was not obvious given the availability in Afrikaans of competing sentences with essentially the same meaning with non-negative indefinites. More interestingly for our purposes, their results also show that there was an important difference in interpretation correlating with the different intonation contours. When pronounced with a neutral intonation, the double negative sentences were mostly interpreted with a concord reading (83% NC, 17% DN), showing this reading to be widely available in Afrikaans, but when pronounced with a contradictory contour, the same sentences were interpreted significantly more with a DN reading than with an NC reading (35% NC, 65% DN). The authors conclude that although both readings are clearly available, DN readings remain rather strongly marked as, on the one hand, they require a special intonation to be triggered and on the other hand, they are far less available as compared to NC in the Afrikaans corpus they consulted (4% vs MISSING NUMBER). It is perhaps notable, however, that when pronounced with a ‘contradictory contour’ the double negative readings still allowed for 35% of NC interpretation, which shows that intonation, though clearly favoring a DN reading does nevertheless not suffice to fully enforce it. In this respect, Bolinger’s observation that the relation between intonation and grammar seems “casual not causal” in that “grammar uses intonation on those frequent encounters, but intonation is not grammatical” (Bolinger, 1965, p. 100) rings true. If so, these results support the view that grammar should allow for DN readings which intonation can help providing access to.

1.1.2 Fonville and De Swart

In a production study whose aims are i) to test Zeijlstra’s claims about the possible interpretation of multiple negative sentence as NC in a DN language like Dutch and ii) to investigate more broadly what factors are at play in the double or single negation reading of these sentences Fonville and De Swart examine the relationship between interpretation and prosody experimentally as there seems to be little literature on this issue beyond Zeijlstra (2010). According to Zeijlstra, Emphatic Multiple Negative Expressions (EMNEs) EMNEs differ from standard negative concord constructions in five ways (Zeijlstra 2007:80-81):

²The results reported in this experiment are a bit puzzling as it is clear from the author’s method description that acceptability judgments were collected using a 7-point Likert scale, yet they are reported in percentages while the data used a 7 point scale rating. Presumably the authors established a threshold in the scale under which the sentence was considered unacceptable, but this is not made clear in the paper.

- (i) EMNEs have an emphatic reading; negative concord constructions usually do not;
- (ii) EMNEs are subject to strict adjacency conditions, contrary to negative concord constructions;
- (iii) The first part of the EMNE must carry stress, otherwise it is ruled out;
- (iv) The meaning of an EMNE is not always straightforward, contrary to most negative concord expressions;
- (v) The formation of EMNEs is not productive; speakers generally differ with respect to which EMNE they accept and which they do not accept.

1.1.3 Espinal & Prieto (2011) Espinal et al (2016)

Espinal et al report the results of a perception study seeking to uncover whether intonation is a sufficient factor to trigger a double negation meaning in mono-propositional sentences in an NC language. Using recorded stimuli which they had previously prosodically analyzed, they tested the perception ability of native speakers of Catalan and Spanish to determine the meaning conveyed by particular intonation patterns as single or double negation in three kinds of utterances, fragment answers, and preverbal NCI sentences with and without an accompanying sentential negation. They show that a specific intonation contour they call contradictory contour described as $L + H^* L!H\%$ in Cat_ToBI and Sp_ToBI reliably produces a DN interpretation in contrast with another contour $L + H^* L\%$ which favors, without however enforcing, a single negation interpretation. This perception study is a follow up to Espinal and Prieto, which report the results of a similar perception experiment limited to fragment answers. In this work, the authors argue that DN readings in NC languages do not reflect a classical compositional computation of two semantic negations, but rather, the output of an inferential process of denial (Geurts 1998). Utterance of an NCI with a contradictory contour convey the rejection of a presupposition and yield a correction effect (i.e. a positive reading) as a conversational implicature. Thus for instance, in the question answer dialogue in figure 3, the NCI with the contradictory contour $L + H^* L!H\%$ leads a DN reading where it is understood that everyone ate desert, because the negative presupposition of the question (someone did not eat dessert) ends up corrected hence leading a positive interpretation through a denial mechanism (Geurts 1998). By the term ‘contradictory intonation contour’ they refer to a statement of the obvious contour (Aguilar et al., 2009) used to deny a discourse-accessible proposition.

Intonation, they conclude influences interpretation here but not through the compositional computation of a syntax prosody interface but with a pragmatic inferential process of denial triggered by a contradictory contour. As they put it in Catalan and Spanish, ‘it is not stress or prosodic phrasing that constrains the final interpretation associated with an isolated n-word, but intonation.’ In their view prosodic tunes are the deciding factor for DN interpretation in these Catalan and Spanish constructions supporting Fretheim’s (1996, 1998, 2002), House’s (1996), and Escandell’s (1998) hypothesis on the role of intonation in inferential processing. Hence DN readings on this view are not strictly speaking an effect of the grammar of these NC languages.

TRANSITION FROM INTRO TO EXPERIMENT 1

2 Experiment 1: Production

2.1 Methods

In order to explore the role of prosody in influencing the meaning of a series of negative expressions, a production task was used. Participants were asked to read aloud simple ambiguous transitive sentences in context and were recorded. A previous study on French employing a picture choice task [CITATION] found that sentences following the form NCI-verb-NCI produced an at-chance distribution of DN and NC interpretations, and thus were highly ambiguous. As such, since the



QUI *no* ha menjat postres?
'Who didn't eat dessert?'



NINGÚ (DN)
**'Nobody' (= Nobody *did* not eat dessert:
 everybody *did* eat dessert.)**

Figure 3: Question, response, and intonational contours for a DN interaction in Catalan from [CITATION].

goal of the study was to study the influence of context on the interpretation of such sentences, it made the most sense to use sentences which were ambiguous and therefore susceptible to the influence of context. For this reason, all critical sentences followed the form

[personne ne VERB rien PP]

where PP is a prepositional phrase of varying length to avoid a sentence-final contour tone falling on the second NCI [CITATION]. Each sentence was embedded in a short context facilitating either a NC or DN interpretation (as in (2)). The contexts facilitating DN interpretations did not contain negative propositions, a construction which has been argued to facilitate DN in all languages, even strict NC ones (Puskás, 2012; Szabolcsi, 2018). Instead, the contexts were simple statements that described situations compatible with a DN reading for our target sentences, offering contingent generalizations which are reinforced by the DN reading as in 2.

- (2) *Chez nous, les profs veulent tous donner leur avis:*
 at our.place, the teachers want all give.INF their opinion
 ‘At our school, all the teachers want to express their opinions’

personne ne dit rien pendant les réunions.
 NCI.person NEG.NULL say NCI.object during the meetings
 ‘nobody says nothing/anything during meetings’

In this example, a generalization is given about the teachers at a given school, and the DN reading reasserts the generalization more forcefully, without resorting to a contradiction or contrastive topic. Previous studies on this topic have not controlled for participant interpretation, instead assuming that speakers would be fully faithful to the provided context. In order to ensure that the participants were in fact accessing and producing a contour corresponding to the intended interpretation, following the reading, subjects were presented with a verification statement which they were asked to assess as true or false according to their interpretation of the target sentence. This response served as a control to ensure that participant interpretation indeed matched the meaning intended by the context.

- (3) *personne ne boit rien dans les soirées*
 NCI.person NEG.NULL drinks NCI.object in the parties
 ‘nobody drinks nothing/ anything at parties’

- (4) (a) NC context:

Dans notre famille, on est tous allergique à l’alcool
 In our family, 3p.sg is all allergic to alcohol
 ‘In our family, we are all allergic to alcohol’

- (b) DN Context:

Chez les jeunes, la consommation d’alcool est effrayante
 Among the youth, the consumption of alcohol is frightening
 ‘Among the youth, the level of alcohol consumption is alarming’

- (c) Target sentence:

personne ne boit rien dans les soirées
 NCI.person NEG.NULL drinks NCI.object in the parties
 ‘nobody drinks nothing/ anything at parties’

For both 4(a) and 4(b), the verification statement was 5.

- (5) *Ils ne boivent pas d'alcool.*
 3p.pl NEG.NULL drink not alcohol
 'They don't drink alcohol'

In the NC context presented in 4(a), the interpretation intended would render the verification statement 5 True: since everyone is allergic to alcohol, no person in the family drinks any alcohol, therefore "they don't drink alcohol" would be true. By contrast, 5 would be false following the DN context in 4(b). Since the consumption of alcohol among the youth has reached frightening levels, one understands that at parties no youth fails to drink, therefore everyone is drinking. Hence the verification statement, "they don't drink alcohol" would be false.

Stimuli were divided into the following 5 categories, with 8 items per category (40 total items per participant):

1. Ambiguous criticals in DN contexts, as in 4(a)
2. Ambiguous criticals in NC contexts, as in 4(b)
3. Single negation controls with a single NCI in subject position: *Personne ne boit ça* (nobody drinks this)
4. Single negation controls with an NCI in object position: *Les gens ne boivent rien* (People drink nothing)
5. Non-negative fillers: *Les enfants boivent du jus* (Children drink juice).

The single-negative conditions were included both as behavioral and prosodic controls to ensure that participants behaved normally in unambiguous situations, as well as to provide a measure for comparison for the prosodic contours in the NC and DN conditions against unambiguous single-negation conditions. To avoid having the behavioral results biased by speakers who have a true or false preference, the truth value of the verification statements were counterbalanced within each category [CITATION]. In order to avoid ordering effects and interference, the items were pseudorandomized in blocks such that no two items from the same condition could appear one after the other, as well as that the contrastive DN/NC pair for a given target sentence could not appear in the same block to avoid interference from the parallel item. All participants saw all 40 items.

To maintain comparability of prosodic contours across conditions and items, the same number of syllables was used in each of the target sentences: two syllables for the subject, one for the verb, and one syllable for the object. In order to avoid having the sentence boundary tone fall on the object NCI, each sentence was concluded by a prepositional phrase of at least two syllables. To maximize acceptability and comparability, the same eight high-frequency monosyllabic verbs were used across all conditions.

In each trial, the full context and target sentence were presented on the screen. Participants were first instructed to take their time to read the context and target sentence in their entirety and arrive at an interpretation. They would then press the spacebar to begin recording where they would read the context and target out loud "as if telling a story to a child". This instruction was included to encourage participants to read naturally and clearly, thus providing the best quality recordings and contrasts for analysis [CITATION]. Once participants had finished recording the current item, they would press the spacebar again to stop the recording and reveal the verification statement, to which they would respond by pressing either V or F on the computer keyboard (corresponding to true and false respectively). No response times were recorded, as reaction time was not a variable of interest in this study. Participants were presented with two practice items, followed by the 40 items that comprised the experiment. Stimuli were presented in white 20-point Arial font on a black background on a computer screen about 40 cm in front of the participant. Recordings were made using an Asus Orion PRO gaming headset with a noise filtering microphone. The experimental session took place in a quiet office and was self-paced by the participant. A complete experimental session (consent, instruction, experiment, demographic

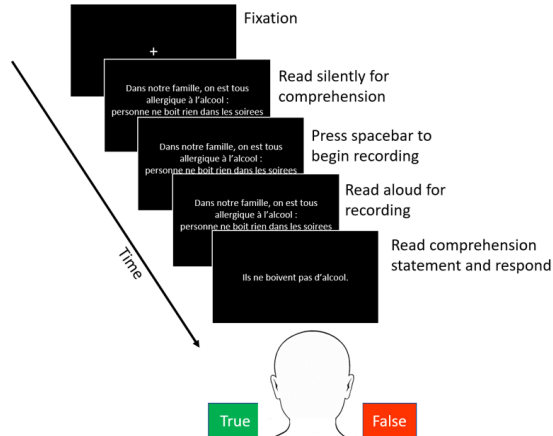


Figure 4: FIX THIS FIGURE

Condition	Structure	Abbreviation	n
Double Negation	NCI-NCI	DN	137
Negative Concord	NCI-NCI	NC	140
Subtotal Criticals			277
Single Negative Object	DP-NCI	NegOb	149
Single Negative Subject	NCI-DP	NegSub	149
Total			575

Table 1: Number of items per condition used in prosodic analyses.

questionnaire, debrief) took about 20 minutes. Participants were remunerated 10 EUR for their time.

2.2 Participants

A total of 28 individuals participated in this experiment (18F, aged 18-45). All were native speakers of continental French representing a variety of regions, and most were students at the University of Lyon, where the data were collected. Participants who did not reliably interpret sentences according to context were excluded ($n = 8$), leaving 20 participants (16F) included in the acoustic analysis presented here.

2.3 Analysis

Only utterances for which participants responded according to the intended meaning were included in the acoustic analysis (table 1). Critical sentences were first excised from the surrounding context using Audacity 2.0.6 and time aligned, matching phonemes and syllables to waveform in Praat (Boersma & Weenink, 2009) using EasyAlign (Goldman, 2011). For this, a six-syllable window of interest was selected: subject (2 syllables), ne, verb (1 syllable), object (1 syllable), and the first syllable of the final prepositional phrase. Once aligned, a Praat script called ProsodyPro (Xu, 2013) was used to extract fundamental frequency (f_0) values, and syllable duration. Ten time-normalized f_0 values, as well as a maximum and minimum f_0 were extracted for each syllable. Extracted f_0 values were then de-meant by participant, and values more than three standard deviations from the mean were removed. Exploratory analyses were conducted comparing mean

duration, f0, and f0 range among and between syllables, as well as across conditions. Visual inspection was used to group participants based upon their mean contours, and these groupings were used in subsequent analyses.

Following these analyses with the de-meanned data, the f0 data were z-scored. This was done to better capture the variations presented by participants who used a narrower pitch range. Furthermore, since the trailing prepositional phrase had varying numbers of syllables depending on the item, data for utterances with a more than two-syllable PP were downsampled to fit a 2-syllable space such that the overall sentence-final contour could be compared across items and conditions.

From on the z-scored f0 data for the larger group (group 1), the following linear mixed-effect model (CITATION) was fit for periods of interest, i.e.: NCIs and NCI boundaries in the critical conditions:

$$f0 \sim (t \times C) + t + C + 1|i + 1|j$$

where t is time, C is experimental condition, i is the experimental item or trial, and j is the participant, such that i and j are taken as random effects in the model. This model is compared to a simpler one that does not include the $(t \times C)$ interaction effect. This comparison thus allows us to infer whether the slope of the f0 over time provides additional explanation of the variance between conditions. The models were fit using the lme4 package (Bates et al., 2015) in R (R Core Team, 2019).

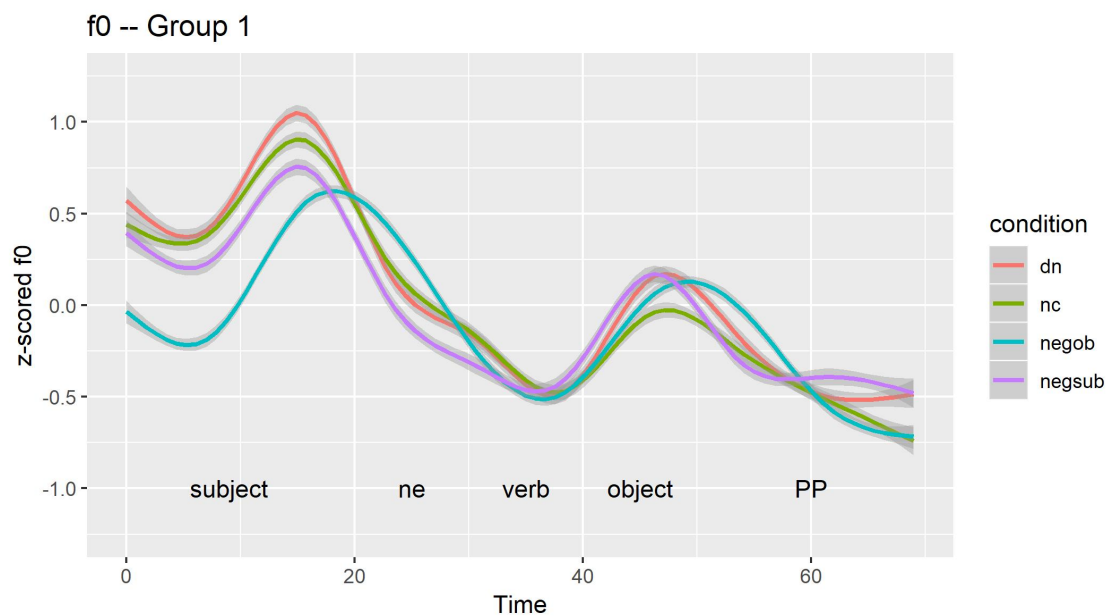
2.4 Results

Overall, the behavioral results from this experiment show that the DN reading is very available to speakers in context, in that the participants were highly reliable in accessing DN readings, but not as much as unambiguous single negative readings (87.1% correct NC, 72.8% correct DN, 96.2% single negative fillers). The focus of our analysis here, however, is investigating the prosodic cues employed to distinguish between experimental conditions, most importantly DN and NC, with the NegOb and NegSub conditions serving as single-negative reference points. Based on visual inspection of prosodic contours in the DN and NC conditions, participants were divided into two main groups: one where a DN/NC distinction appears on the second NCI (group 1, $n = 14$) and one where a DN/NC distinction appears on the first NCI (group 2, $n = 4$)³. In each of these cases, taking into account only the DN and NC contours, f0 in the DN condition appears to have a steeper contrast which appears in the form of higher peaks (figure 5a).

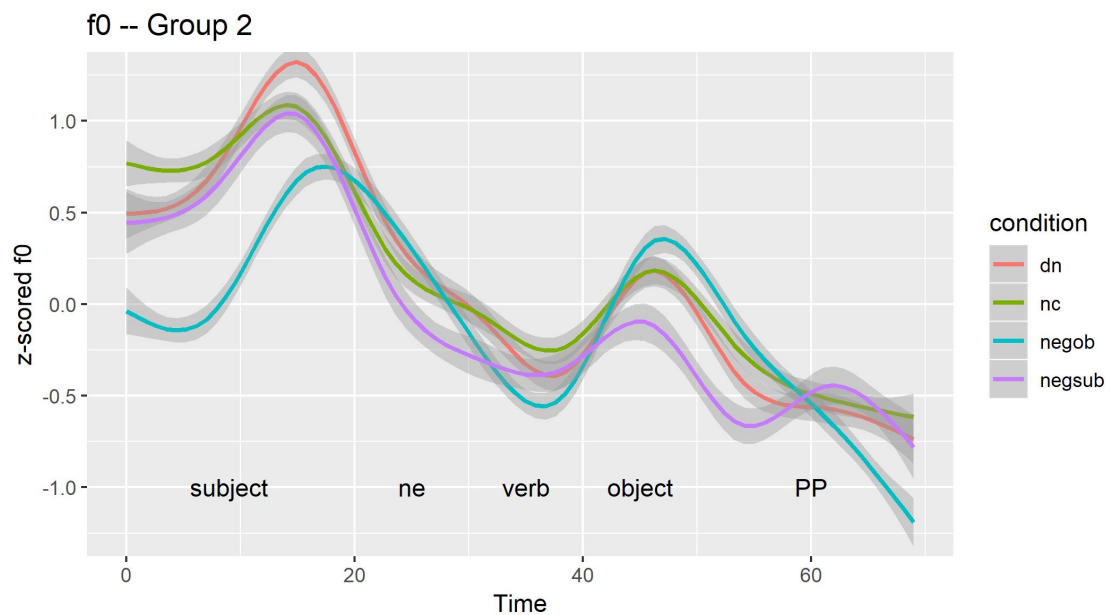
In the case of group 2, we observe significant differences between the DN and NC conditions (indicated by the non-overlap of the 95% confidence interval in figure 5b) only during the subject NCI. The pitch contour of the DN condition begins lower, peaks higher, and then reconverges with the NC contour. During the rest of the utterance, no significant differences are observed. In the case of group 1, however, the pattern is slightly different. The two contours do not differ during the first NCI except at the peak of the second syllable, where a significant difference is observed (higher pitch in DN condition) before reconvergence. In this group, however, the data re-diverge during the object NCI, demonstrating the same pattern, wherein the pitch during the syllable appears much higher in the DN condition, before re-convergence. Given only these data, it might appear that the DN contour is marked by higher pitch accents on the NCIs relative to the NC contour.

In order to clarify this further, we compared the critical conditions to the control conditions which contained only a single NCI per utterance. Based on this comparison, it appears not to be the case that the DN reading is necessarily marked by higher pitch accents on the NCIs, but rather that the NC reading is marked by a flattening of pitch on the NCIs relative to the other conditions. When compared to the single negative conditions (especially on the object NCI), it becomes clear that the 3 other conditions (DN, NegOb, NegSub) do not significantly differ in pitch, but the NC contour does, appearing significantly lower. In both groups, and on both subject and object NCIs, the pitch contour appears flatter and generally lower in the NC condition than the DN one.

³Two participants did not match the patterns of either group 1 or group 2.



(a) Prosodic contours by condition for group 1.



(b) Prosodic contours by condition for group 2.

Figure 5: Prosodic contours by condition

Generally speaking, the NC condition bears the same prosodic shape as the control conditions (particularly around the object NCI), but is realized lower, while the DN condition is a different, steeper shape. This is evidenced by the results of our statistical model. In the NC condition, the intercept is significantly lower than the other conditions (including the controls), but the slope does not significantly differ from the other conditions ($p = 0.051$). By contrast, the DN condition differs only from the NC condition (not the controls) in intercept, but has a significantly different slope than all other conditions ($p = 0.000017$). Thus, the DN condition is characterized by sharper slopes than the NC and control conditions, but the NC condition has a lower intercept than the DN and control conditions. These results were confirmed by follow-up ANOVAs.

Furthermore, all of the conditions appear to follow the same sentence-final contour with a falling tone after the object. This falling contour presents varying amounts of steepness, but appears consistent in shape across groups and conditions. This falls in contrast to previous work done on prosody in DN and NC (CITATION), which discusses a contradiction contour marked by a rising or high boundary tone at the end of DN utterances, thus differentiating them from their NC counterparts. This rising tone is not observed in our data, and we appear only to have significant differences on or around the NCIs, thus pointing away from an utterance-level contradiction contour.

2.5 Discussion

The results from this production experiment clearly point to NC and DN sentences being realized with different prosodic contours. The significant differences appear over the NCIs, in such a way that no overall different sentential contour is observed. The mere fact that our analyses have revealed significant results does not necessarily entail that the measured differences are a) detectable by an interlocutor, or b) able to be accessed and used to achieve the intended interpretation. As such, a perception study was necessary to ensure that the prosodic cues could be accessed and used appropriately.

3 Experiment 2: Perception

4 Discussion

DN for strong reassertion – not talked about in the literature

5 Conclusions

References

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